THURSDAY, NOVEMBER 24, 1887.

CHARLES DARWIN.

The Life and Letters of Charles Darwin, including an Autobiographical Chapter. Edited by his Son, Francis Darwin. In Three Volumes. (London: John Murray, 1887.)

TO write a biography is a task which is almost a proverb for difficulty. It is no easier for a relative than for a stranger, because, if a more intimate knowledge of the details lightens the labour, affection is apt to warp the judgment, and checks perfect freedom of expression. In the biography, however, of Charles Darwin, there was no temptation to reticence, no need for firmness. His was a life, simple, noble, blameless. Still, this very simplicity and unostentatious rectitude presented their own difficulties. After the long and interesting voyage in early manhood, it was a life singularly uneventful, a life of patient labour, one long struggle against sickness. Thus its record when written might readily have been unexceptionable, but dull.

This cannot be said of the Life of Charles Darwin. It will take its place, I venture to predict, with Boswell's Life of Johnson, Lockhart's Life of Scott, Stanley's Life of Arnold, and the comparatively small number of biographies which have attained to first-class rank in literature. Mr. Francis Darwin has made excellent use of the materials at his disposal. These were considerable. They consisted of a short sketch written in his later years by Charles Darwin himself, for the information of his family, and of a large number of letters. Mr. Francis Darwin had, in addition, the special advantage of having shared in the labours of his father during the last eight years of his life.

The chapters written by the editor are of the highest interest and value, but as far as possible the story is told by Charles Darwin himself; the letters being merely strung together by occasional explanatory paragraphs, which form a connecting thread. Selection must have been no easy task, but it has been well done, and numerous as are the letters and large as is the book one almost wishes they had been more and it had been larger. Yet Darwin was hardly what most people would call a good letter-writer. His letters were often written hurriedly, and bear the marks of hasty composition; but there is not seldom a terseness of phrase, and always a vigour of expression, which makes them peculiarly attractive. These letters, too, are thoroughly characteristic of the man. They breathe the quenchless energy, the "dogged" *endurance, the hidden tenderness, the sweet reasonable*ness, the imperturbable equanimity, of his nature; and they show, on rare occasions, that capacity for indignation without which a character so amiable might have degenerated into weakness.

The autobiographical sketch tells us the particulars of Charles Darwin's early life. Born at Shrewsbury in 1809, the son of a physician in large practice, and grandson of the well-known Dr. Erasmus Darwin, author of "Zoonomia," Charles Darwin was educated at the grammar-school of that town, under Dr. Butler, one of its most noted head masters. Neither in childhood nor in boyhood does he appear to have given promise of exceptional powers, though the taste for collecting manifested itself at a very early age, and he was obviously more thoughtful and determined to understand things thoroughly than the average boy. But the school system of education which, as usual then, was wholly classical, did nothing to bring out the special powers of his mind. Indeed, he was once even rebuked by the head master for wasting his time on such a useless subject as chemistry. He passed, in short, through Shrewsbury school as a well-conducted boy of ordinary ability, perhaps a little below the average. "A good lad, but not quick or particularly studious," would probably have been the verdict of his masters.

After leaving Shrewsbury, Darwin studied for a couple of years at the University of Edinburgh, attending medical lectures, with the idea of adopting that profession. But for the surgical side of it he already felt a disinclination; and unfortunately for him, as he relates, the dreariness of the lectures on anatomy indirectly deterred him from the practice of dissection, which would have been a useful training for his later life. He made, however, friends, who aided in developing his love for natural history, though he tells us that the dullness of the geological lectures produced in him "the determination never as long as I lived to read a book in geology, or in any way to study the science." A resolve, happily, before long rescinded.

From Edinburgh, Charles Darwin went to Cambridge. Here he entered at Christ's College, where his elder brother, Erasmus, was already a student. There was then an idea that, as he clearly had no strong taste for medicine, he should be ordained. As he says, "Considering how fiercely I have been attacked by the orthodox, it seems ludicrous that I once intended to be a clergyman." Darwin had at no time of his life any tendency to superstition, otherwise one might observe that extremes in religious opinion are not so wide apart as the remark just quoted seems to imply. At the same time he tells us that a German phrenologist had declared that he "had the bump of reverence developed enough for ten priests."

He brought little classical knowledge from Shrewsbury, and left much of that behind at Edinburgh; he had no taste for mathematics, and natural science was not then recognized in the curriculum at Cambridge. So he read little, and took an ordinary degree. Thus he doubtless appeared to be wasting his time, and accuses himself of so doing. But one can see that the groundwork was being laid for the future. He acquired friends, some of like tastes; his interest in natural history increased, and was developed by the opportunities which the district afforded, especially for collecting beetles, then the ruling passion. His health, too, at this time appears to have been good; he was an active pedestrian and a keen sportsman, enjoying society, and not without a love of music.

But the friendship of Henslow was probably the greatest boon which he owed to Cambridge. Acquaintance soon ripened into steadfast friendship, and the wider knowledge and formed habits of the older man produced, as Darwin gratefully admits, the best possible influence on the younger. Through Henslow also, shortly after Darwin had taken his degree, the offer was made to join the *Beagle* as naturalist, which may fairly be called the turning-point of his life. It is interesting to see how evenly balanced the reasons for and against acceptance then seemed to be, and how nearly the offer was refused. He wished to go, but Dr. Darwin, his father, for various reasons—among them the fear that so long a voyage would unsettle his son for life—was opposed to the plan. Chiefly through the influence of Darwin's maternal uncle, Mr. Josiah Wedgwood, the father's objections were overcome. Capt. Fitzroy, however, who was a disciple of Lavater, was nearly refusing his services because of the shape of his nose, which was not sufficiently indicative of determination and energy! Considerable delay arose from one cause or another, but the vessel finally sailed from Plymouth on December 27, 1831.

Though Henslow was Professor of Botany, it was impossible to know him without being infected with geology; so by this time the resolution against that science had been rescinded, and Darwin had even accompanied Sedgwick on one of his journeys in North Wales. The tale of the work during the voyage of the *Beagle* has been told in the well-known volumes; but we have here a series of letters which record many incidents of the journey, and indicate the development of the writer's mental powers and the thoughts which were already beginning to quicken into life. It is amusing to read that now the new love is sometimes stronger than the old. "But geology carries the day; it is like the pleasure of gambling. Speculating on first arriving what the rocks may be, I often mentally cry out, 'Three to one Tertiary against Primitive,' but the latter have hitherto won all the bets." Later there is a conflict even in his geological preferences. "I am quite charmed with geology, but, like the wise animal between two bundles of hay, I do not know which to like the best, the old crystalline group of rocks or the softer and fossiliferous beds." But notwithstanding these mental "lovers' quarrels," notwithstanding the serious drawback of incessant suffering from sea-sickness, and one grave illness of an unknown nature, a large number of specimens and a wonderful store of observations were accumulated in almost every department of natural history, which served as the foundation for the great superstructure to which his life was devoted.

On Darwin's return to England in 1836, he oscillated for a time between Cambridge and London, working at the results of his voyage as hard as his health, now seriously impaired, permitted. In 1839 he married, and after residing in Gower Street till the autumn of 1842, moved, in the hope of benefit from country air, to a house which he purchased at Down, in Kent, and in which the remainder of his life was spent.

Here, after the immediate fruits of the *Beagle* voyage were given to the world, he began to develop the great idea of which the germ had been sown and quickened during his wanderings. One chapter describes how "the foundations of the Origin of Species were laid" between the years 1837 and 1844; another narrates its growth. In 1856, partly in consequence of Lyell's advice, the book was begun for which such long preparation had been made, and by the month of June 1858 about one-half was written. It was, however, on a much greater scale than that which has now become classic in England,—"three or four times as extensive." Then suddenly all was changed by the receipt of a manuscript from Mr. Wallace, from his distant sphere of work in the Malay Archipelago, which coincided so exactly with his own views that, as Darwin writes to Lyell, "if Wallace had my manuscript sketch written out in 1842, he could not have made a better short abstract." The story of this interesting episode, so honourable in every respect to all concerned, is told, chiefly by means of letters, in one chapter of the book. In these days, when too often the stream of scientific life is ruffled by miserable personal squabbles about priority in some trifling discovery, it is well to learn how men acted whose hearts were as large as their intellects were great.

The result of the simultaneous announcement of the hypothesis thus independently framed was that the plan of the larger work was abandoned, and the "Origin of Species by means of Natural Selection," or "An Abstract of an Essay on the Origin of Species through Natural Selection," as the author would have preferred to call it, was published in 1859. It is needless to epitomize the story of its reception by the public—of the opposition which it encountered—of the storm which it aroused—of its ultimate triumph: all this is admirably told by Prof. Huxley in a chapter which he has contributed to the work.

Of all the accusations brought against Darwin, perhaps the most unreasonable was the frequent one that he had "abandoned the true Baconian method." I do not profess to be very familiar with the philosophy of Bacon; but if accumulating a mass of facts, co-ordinating them, and then drawing inductions, is not the true method of science, I do not know of any other; and this method inspires every chapter of the "Origin of Species."

In the correspondence which was written during the remainder of the author's life, occupying nearly half the work, we read of how the "Origin of Species" won its way, edition following edition, and of the series of later works and occasional papers which continued till within a few months of the end. This came rather suddenly, though in the fullness of years. For the last ten years of his life his health had appeared somewhat better than formerly, but in the early months of 1882 it gave repeated cause for alarm, and at last, on April 19, after a brief period of suffering, he ceased from that labour which only sickness had ever made a burden.

The quantity of work which he had accomplished is astonishing when its quality—always the best that could be done by the man—is considered. True, Darwin, though only to be called wealthy towards the end of his life, was always free from the necessity of bread-winning. But then—and what a terrible set-off this implies—"for nearly forty years he never knew one day of the health of ordinary men, and thus his life was one long struggle against the weariness and strain of sickness."

In one respect Darwin was *felix opportunitate vitæ*. He lived before scientific literature had attained its present overwhelming proportions. It is charming to read such a passage as this: "Geology is a capital science to begin, as it requires nothing but a little reading, thinking, and hammering." We might add, "with the mind of a Darwin,"—at least to get such wonderful results as in the "Geological Observations." If anyone of the present day is getting proud of what he may have done in petrology, I would prescribe Part I. of that work as a corrective. But if now we learn much from others, and gain much from the perfection of our means of research, we are apt to lose in independence and vigour of mind, to say nothing of the time which is wasted in the weary wading through piles of periodicals, often with but little fruit as the result. Mathematicians know that solving problems gives a strength to the mind which cannot be obtained from the most careful study of book-work, and I have often ventured to think that to write the section on the "literature of the subject" as the last stage of a research is not so much to "put the cart before the horse" as it seems. Something, too, may be lost through the very perfection of the means of research in natural history: the mind may be tempted to dwell too much on details; and the over-careful study of these may lead men to miss the greater principles. Darwin was an observer, precise and minute as any, but it is interesting to note that he was always guided by a selective principle.

The greatest charm of the "Life" is that it draws so vivid a picture of the man himself—partly from the unconscious self-portraiture of his letters, partly from the tender touch of his son's hand, aided by the loving memories of other members of his family. Before us rises that tall, slightly stooping form, either walking with swinging though often feeble step, cloaked and staff in hand, along the "sand walk," or seated or reclining in that study which bore silent testimony to the orderly habits learnt in the tiny cabin of the *Beagle;* we see that massive forehead, those keen yet kindly eyes, shadowed by those overhanging brows, the sparse gray hair, the long gray beard, that winning smile which lit up those rugged features; we hear once more the kindly voice; but better still, there rises, fresh and ever instructive, the memory not only of one of the grandest intellects, but also of one of the noblest and truest natures, among the sons of men. Unruffled by carping criticism and virulent abuse, in silent dignity Charles Darwin laboured on, in the quiet consciousness of strength and the conviction that truth would at last prevail. No one can read the life of Darwin without feeling as if some healthful air from a better world had braced his moral fibre and nerved him for more earnest and more unselfish work.

Truly the last scene of all was a "Great Lesson." His family would have laid him in the quiet churchyard near his own home, but his fellow-workers in science desired and obtained that his grave should be made in Westminster Abbey. Some quarter of a century before that day many thoughtful men hesitated in accepting, or even opposed, the views which he had maintained; while the camp-followers and swash-bucklers of the religious world had discharged at him their volleys of vituperation. The one had been for the most part persuaded; the other had slunk away to growl in obscurity. Now, around that grave in the Valhalla of Britain, were gathered the leaders in literature and science, men of every rank in life, of every form of creed—from the most sincere Christian to the no less sincere Agnostic. Time had shown that there was no necessary opposition between the inductions of science and those deeper aspirations and beliefs upon which we must not here touch, and men who on such points felt deeply but differently from Charles Darwin came no less willingly than others to pay the last honours to one who was not only a great philosopher but also emphatically a good man. T. G. BONNEY.

OUR BOOK SHELF.

A Treatise on the Integral Calculus. Part I. Containing an Elementary Account of Elliptic Integrals and Applications to Plane Curves, with numerous Examples. By Ralph A. Roberts, M.A. (Dublin: Hodges, 1887.)

MOST students, on taking up this book, will be disposed to ask, "Is there any room or necessity for another work on the Calculus just now? Is not Williamson up to date?" Mr. Roberts gives no sign, and so we are led to search out for ourselves a reason for the existence of the work, and a justification of the same. In his two previous books our author makes great use of elliptic functions, and a chapter is devoted to the discussion of them in the book before us, and, further, this fact is prominently noted on the title-page; hence we conclude that Mr. Roberts has had in view mainly the treatment of these integrals, and to make his treatise self-sufficient he has surrounded this special subject with such preliminaries and accessories as he deems suitable for the elucidation of his theme. The author has produced a capital book, for he writes with extreme care, and full knowledge and command of his subject. There appears to us to be in many parts a novel treatment—*i.e.* considering the matter in the light of English treatises on the Calculus—and there is copious illustration. There is large opportunity for practice afforded by the numerous examples inserted in the body of the work, and also at the end. Many of these are not intended, or at any rate are not suitable, for babes; they are strong meat for adults. There is an index and the usual table of contents.

Solutions to Problems contained in a Treatise on Plane Co-ordinate Geometry. By I. Todhunter, F.R.S. Edited by C. W. Bourne, M.A. (London: Macmillan and Co., 1887.)

THIS is not a work brought out with a rush, for the greater portion of the solutions were drawn up by the author fifteen years ago. To students using the text-book this will be a valuable companion, for Mr. Bourne has executed his task with care and ability. Geometrical as well as analytical solutions are given, and impart a pleasant feature to the book. For Mr. Bourne's sake we regret that the foundation is giving way, as few students now read the "Conics," for that fate is befalling it which the author himself says is "the fate of all academical text-books," viz. obscurity ("W. Whewell," vol. i. p. 24). Todhunter's own views respecting "Printed Solutions" are given in his "Essays" (p. 81). The exercises, however, will retain their utility as tests for ascertaining a pupil's grasp of the subject, in spite of the decay of the setting, and the "Solutions" we can recommend to students "after a vigorous effort has been made to obtain the solution without the book."

Lectures on Bacteria. By A. De Bary. Second Improved Edition. Authorized Translation by Henry E. F. Garnsey. Revised by I. B. Balfour, F.R.S. (Oxford: Clarendon Press, 1887.)

THIS work is in the main an abridgment of a number of lectures, some of which were delivered in a connected series as a University course, others as occasional and separate addresses. The author's aim is to set forth the present state of our knowledge respecting the objects included under the name of Bacteria. Having dealt with cell-forms, cell-unions, and cell-groupings, he describes the course of development of Bacteria, and then proceeds to discuss questions as to the position of Bacteria in the organic world, and as to their origin and distribution. A chapter on vegetative processes is followed by one on the relation of Bacteria to, and their effect upon, their substratum; and this leads to an account of the forms which excite fermentation, and of parasitic Bacteria. The remaining chapters are on the harmless parasites of warm-blooded animals, on anthrax and fowl-cholera, on the